BLACK ROT DISEASE DETECTION IN GRAPE PLANT USING COLOUR BASED SEGMENTATION & MECHINE LEARNING

AMRITHA U

Roll NO : 06

Product Owner : Mr. Hyderali K

TABLE OF CONTENTS

BLACK ROT DISEASE PREDICTION

Black Rot is a fungal disease which affects the yield as well as the wine quality and can also cause complete crop loss. It can be identified as brown/tan coloured circular spots/lesions distributed unevenly on the leaf of the plant. A proper detection of the disease is required which can be further helpful in taking active measures like Spraying of Fungicides, Pruning, etc. can be done on time. The Plant Village Dataset is used, which contains images of grape plant leaves affected from Block Rot Disease as well as the pictures of healthy leaves. HSV and L*a*b* colour models are used for the segmentation purposes. The healthy part and the diseased part of the leaves are separated using color-based techniques and the features are stored for each leaf. The color of diseased part is very much different from the healthy part of the leaves which makes it easier to detect the disease on the basis of color. The machine learning is done using K-Nearest Neighbour(KNN)algorithm

METHODOLOGY

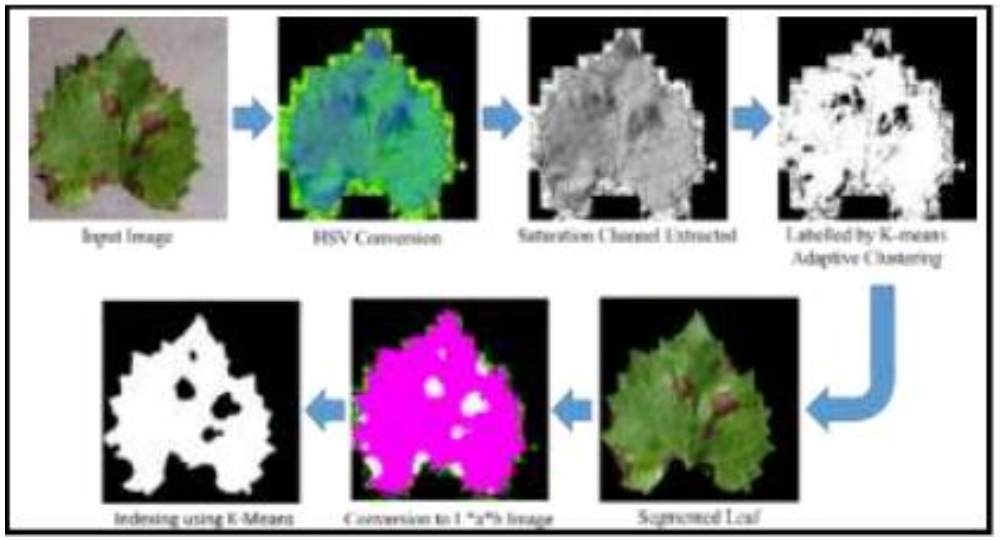
- Methodology uses 2 colour models HSV and L*a*b model.
- It involves the image to be converted into HSV format .the leaf part is segmented from the image.
- The diseased part is extracted using L*a*b model, in combination with

  k means adaptive clustering.
- Gray scaling is applied on the extracted healthy and diseased Images.
- The pixel count is computed on the basis of white pixels in both cases(healthy as well as diseased).
- The classification is applied using supervised machine learning algorithm, k-nearest neighbour with different k values.

❑ Feature extraction using HSV & L*a*b and segmentation

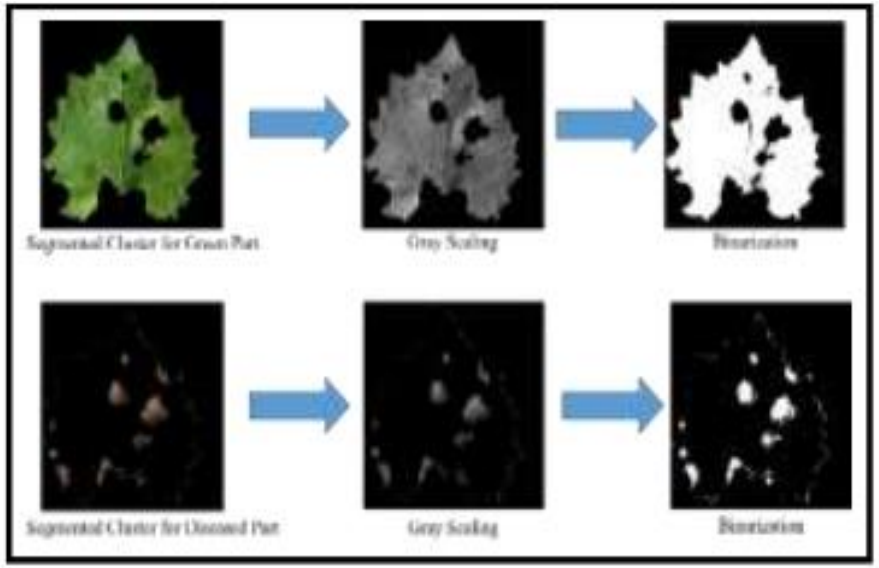
feature extraction

a) Input image
b) Image after conversion to HSV model
c) Extracted saturation channel
d) Labelled clusters by k-means clustering
e) Segmented leaf
f) Conversion to L*a*b model
g) Segmented unaffected part



Segmentation

a) Segmented green/unaffected area
b) Gray scaling
c) Binarization
d) Segmented brown/unaffected area
e) Gray scaling of unaffected area
f) Binarization of affected area



- k-Nearest Neighbour Algorithm

1. Load the data
2. Divide the data into training data and test data
3. Initialize the value of k
4. Calculate the Euclidean distance between the test data and each of the training data
5. Find k number of nearest neighbors having minimum distance values
6. Get the most frequent class of these neighbors
7. This will be the predicted class

- Choice of k

- ✓ If k is small, the result will be affected by noisy data
- ✓ If k is large, the algorithm will be computationally expensive
- ✓ The best k value is somewhere between these two extremes
- ✓ We can choose k as the square root of the number of training data
- ✓ An alternative approach is to test several k values on a variety of test data sets and choose the one that delivers the best performance

FUTURE ENHANCEMENT

- In this project only the final disease prediction can be done, next planning to predict different level prediction to include more algorithm.
- Try to include module named Agriculture office to connect farmers in a locality

MODULES

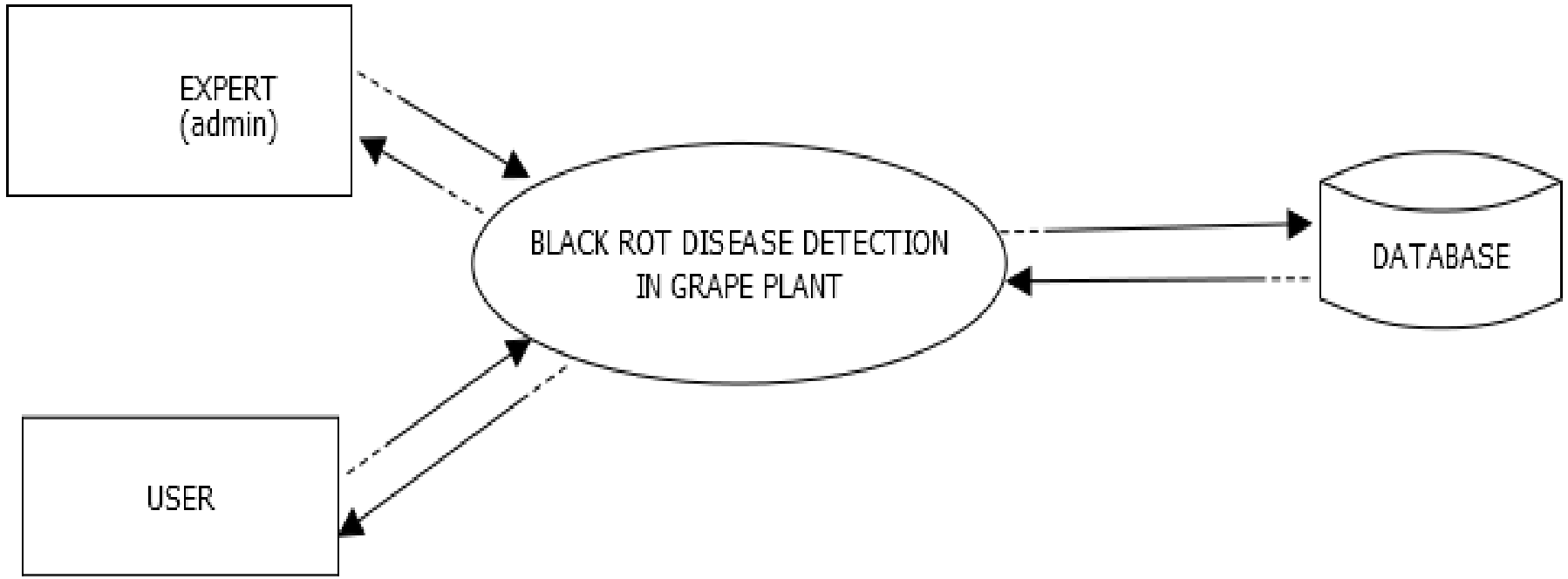
- Expert System
  - Login
  - Add and manage dataset
  - View farmers
  - Chat with farmers
  - Send notification
  - View feedback
  - Add fertilizer

❖ Farmers

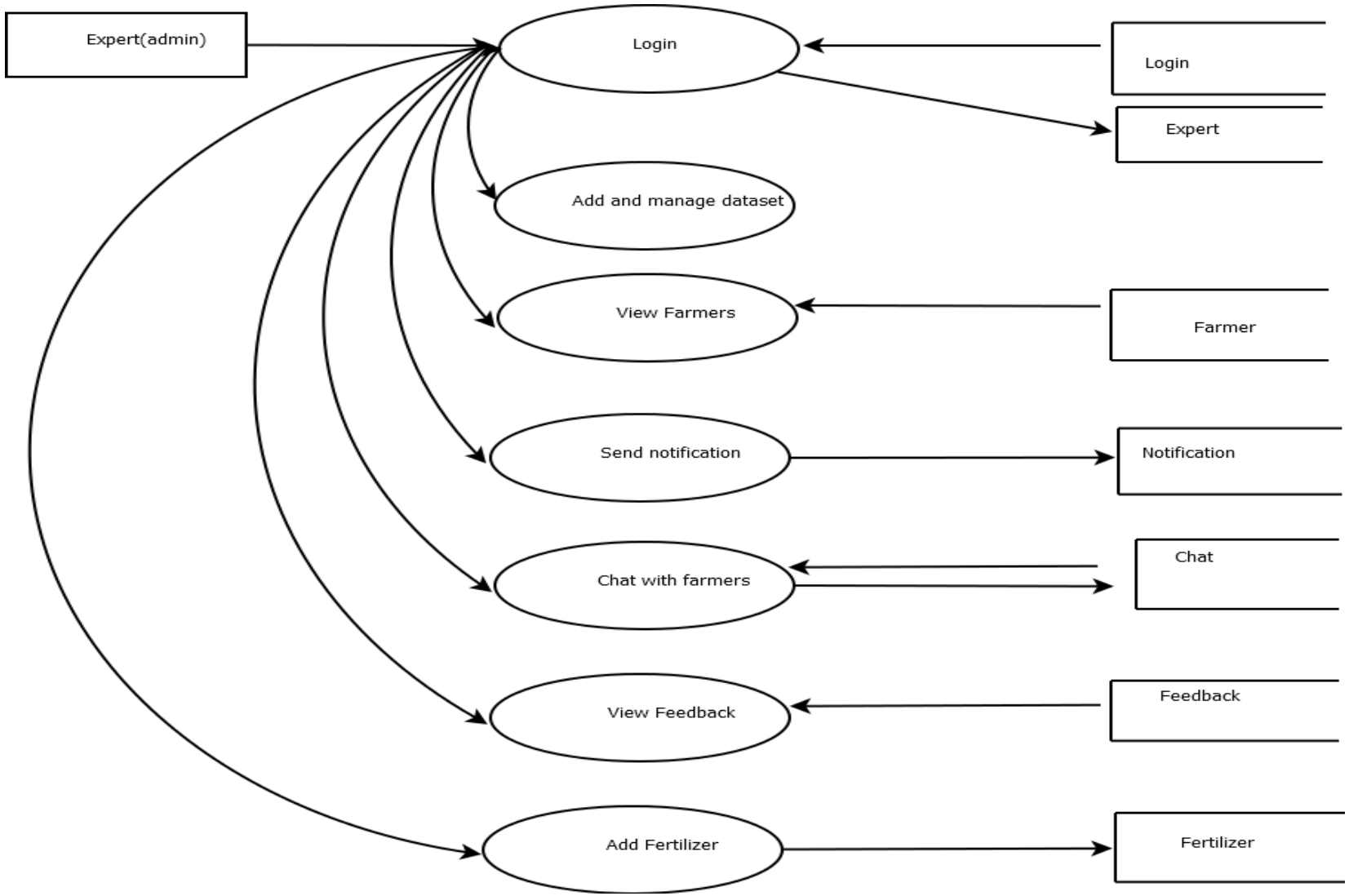
- Registration
- Login
- Upload leaf image & View prediction result
- Chat with experts
- View notifications
- Send feedbacks
- View fertilizer

DATA FLOW DIAGRAM

- LEVEL 0 :



- LEVEL 1 :


Expert(admin)
Login
Login
Expert
Add and manage dataset
View Farmers
Farmer
Send notification
Notification
Chat with farmers
Chat
View Feedback
Feedback
Add Fertilizer
Fertilizer

- LEVEL 2 :

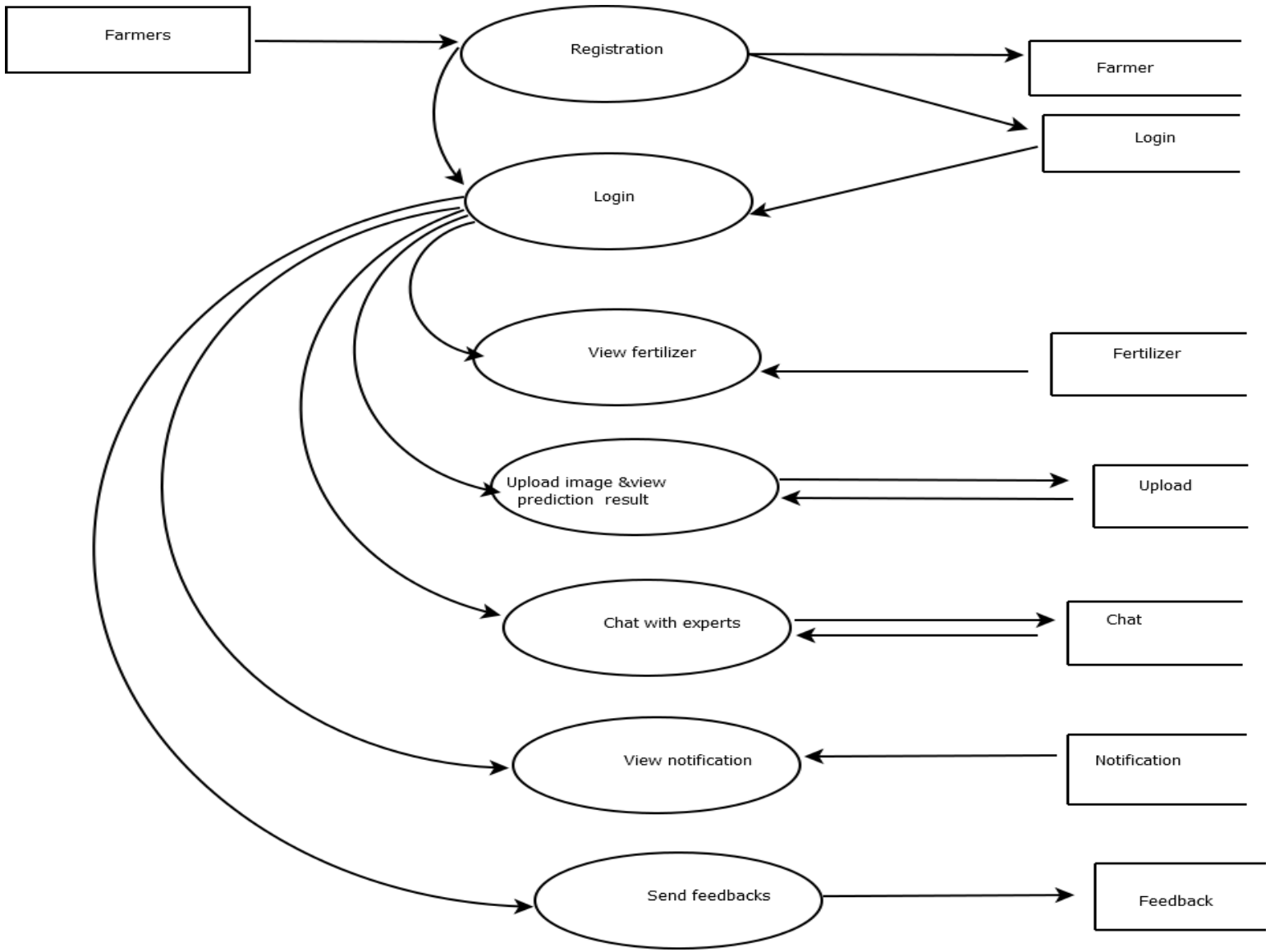

Farmers
Registration
Farmer
Login
Login
Login
View fertilizer
Fertilizer
Upload image &view
prediction result
Upload
Chat with experts
Chat
View notification
Notification
Send feedbacks
Feedback

TABLE DESIGN

Login

1 Columns | 2 Indexes | 3 Foreign Keys | 4 Advanced | 5 SQL Preview

Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
lid	int	11		☑	☑	☐	☑	☐	☐	
username	varchar	25		☐	☐	☐	☐	☐	☐	
password	varchar	25		☐	☐	☐	☐	☐	☐	
type	varchar	25		☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Notification

1 Columns | 2 Indexes | 3 Foreign Keys | 4 Advanced | 5 SQL Preview

Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
nid	int	11		☑	☑	☐	☑	☐	☐	
notification	varchar	100		☐	☐	☐	☐	☐	☐	
date	date			☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Farmer

1 Columns | 2 Indexes | 3 Foreign Keys | 4 Advanced | 5 SQL Preview

Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
fid	int	11		☑	☑	☐	☑	☐	☐	
lid	int	11		☐	☐	☐	☐	☐	☐	
fname	varchar	25		☐	☐	☐	☐	☐	☐	
lname	varchar	25		☐	☐	☐	☐	☐	☐	
phone	bigint	20		☐	☐	☐	☐	☐	☐	
place	varchar	25		☐	☐	☐	☐	☐	☐	
pin	int	11		☐	☐	☐	☐	☐	☐	
post	varchar	25		☐	☐	☐	☐	☐	☐	
email	varchar	50		☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Chat

1 Columns | 2 Indexes | 3 Foreign Keys | 4 Advanced | 5 SQL Preview

Hide language options

Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
chat_id	int	11		☑	☑	☐	☑	☐	☐	
fid	int	11		☐	☐	☐	☐	☐	☐	
tid	int	11		☐	☐	☐	☐	☐	☐	
message	varchar	50		☐	☐	☐	☐	☐	☐	
date	date			☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

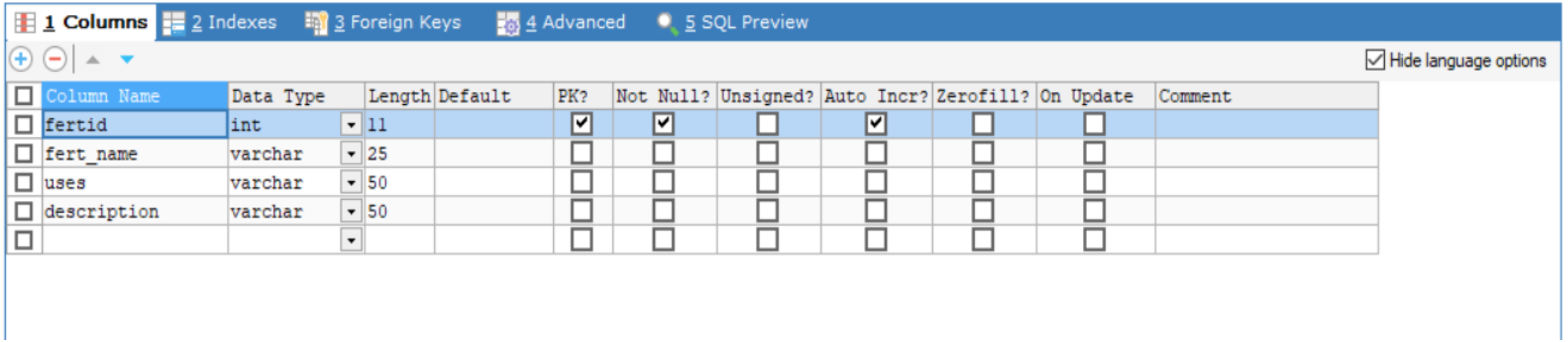
Feedback

1 Columns | 2 Indexes | 3 Foreign Keys | 4 Advanced | 5 SQL Preview

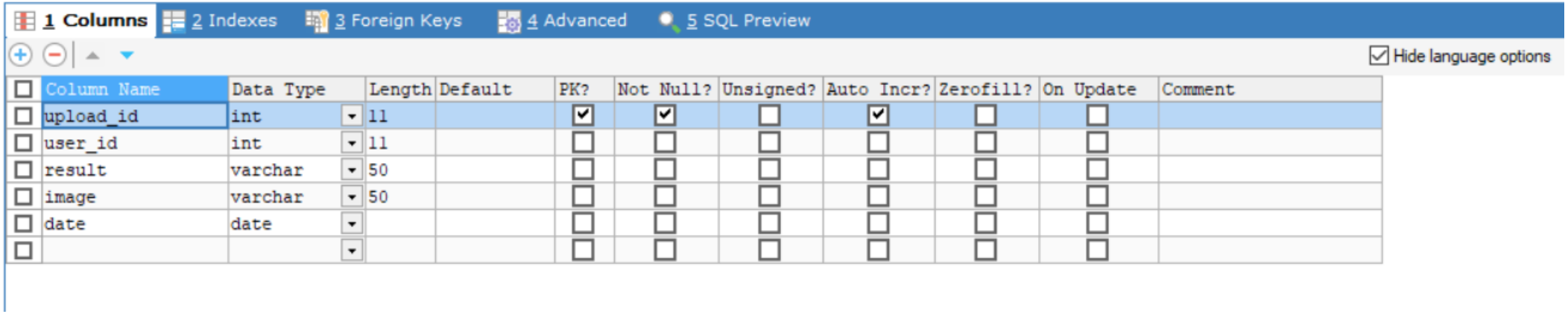
Hide language options

Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
feedid	int	11		☑	☑	☐	☑	☐	☐	
feedback	varchar	100		☐	☐	☐	☐	☐	☐	
date	date			☐	☐	☐	☐	☐	☐	
lid	int	11		☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Fertilizer



Upload



Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
upload_id	int	11		☑	☑	☐	☑	☐	☐	
user_id	int	11		☐	☐	☐	☐	☐	☐	
result	varchar	50		☐	☐	☐	☐	☐	☐	
image	varchar	50		☐	☐	☐	☐	☐	☐	
date	date			☐	☐	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

DEVELOPING ENVIRONMENT

- OPERATING SYSTEM : WINDOWS 10
- FRONT END : HTML, CSS, JAVASCRIPT
- BACK END : MySQL
- Dataset: Plant Village Dataset from Kaggle website is used
- IDE : JetBrains PyCharm, Android studio
- TECHNOLOGY USED : PYTHON,JAVA
- FRAME WORK USED : Flask

PRODUCT BACKLOG

User Story ID	Priority <High/Medium/Low>	Size (Hours)	Sprint <#>	Status <Planned/In progress/Completed>	Release Date	Release Goal
1	Medium	2	1	Completed	8/01/2022	Table design
2	High	3		Completed	8/01/2022	Form design
3	High	5		Completed	8/01/2022	Basic coding
4	High	5	2	Completed	22/1/2022	collects the features of the disease
5	Medium	5		Completed	22/01/2022	Training the data
6	High	5	3	Completed	5/02/2022	classify different leaf images using SVM
7	Medium	5		Completed	17/02/2022	find Black Rot disease
8	Medium	5	4	Completed	20/02/2022	Testing data
9	High	5		Completed	20/02/2022	Output generation

USER STORIES

UserStoryID	As a <type of user>	I want to	So that I can
1	Expert	login	login successful with correct username and password
2	Expert	Add & Manage Dataset	Add disease effected leaf Image to dataset, compare to uploaded image in here to predict disease
3	Expert	View farmer	View registered farmer details
4	Expert	Chat with farmers	Chat with farmers
5	Expert	Send notification	Send notification to user
6	Expert	View feedback	View user feedback
7	Expert	Add fertilizer	Add fertilizer details
8	User	Registration	User can register
9	User	Login	Login successful with correct username and password
10	User	Upload leaf image & view prediction result	Upload image and view result
11	User	Chat with expert	Chat with expert
12	User	View notification	View notification
13	User	Send feedback	Send feedback to expert
14	User	View fertilizer	View fertilizer

PROJECT PLAN

User Story ID	Task Name	Start Date	End Date	Days	Status
1	Sprint 1	26/12/2021	28/12/2021	2	Completed
2		29/12/2021	31/12/2021	3	Completed
3		03/12/2021	08/01/2022	5	Completed
4	Sprint 2	09/01/2022	16/01/2022	8	Completed
5		18/01/2022	22/01/2022	5	Completed
6	Sprint 3	23/01/2022	27/01/2022	5	Completed
7		30/01/2022	05/02/2022	7	Completed
8	Sprint 4	06/02/2022	10/02/2022	5	Completed
9		16/02/2022	20/02/2022	4	Completed

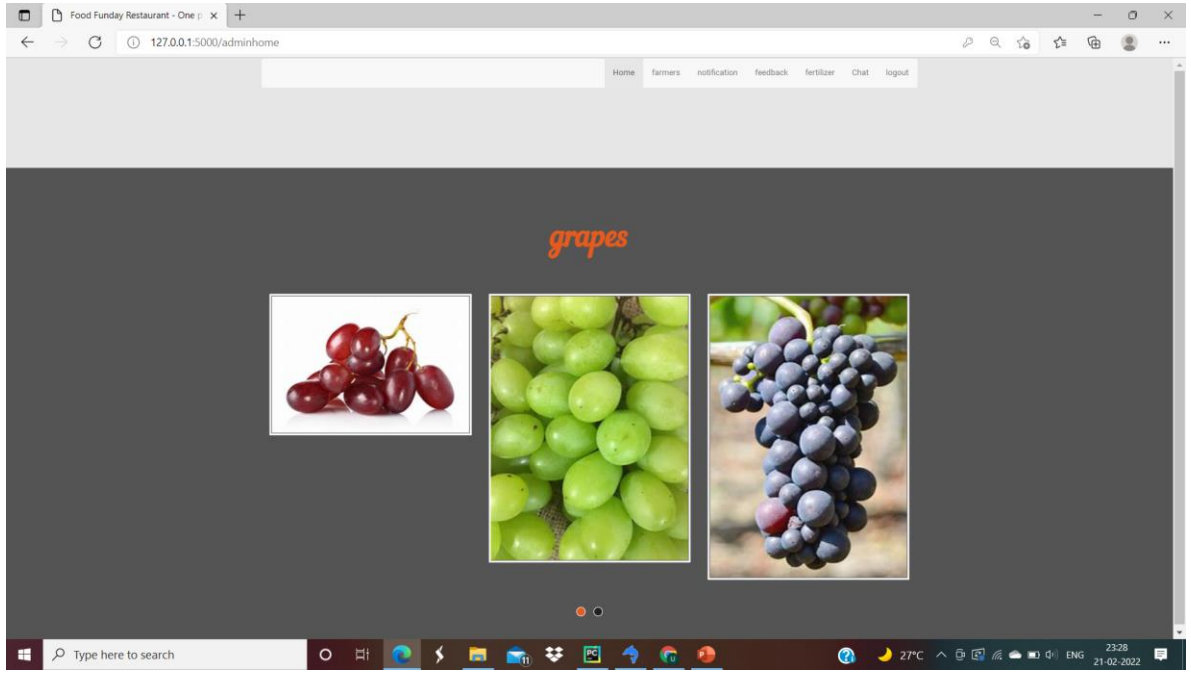
SPRINT BACKLOG PLAN

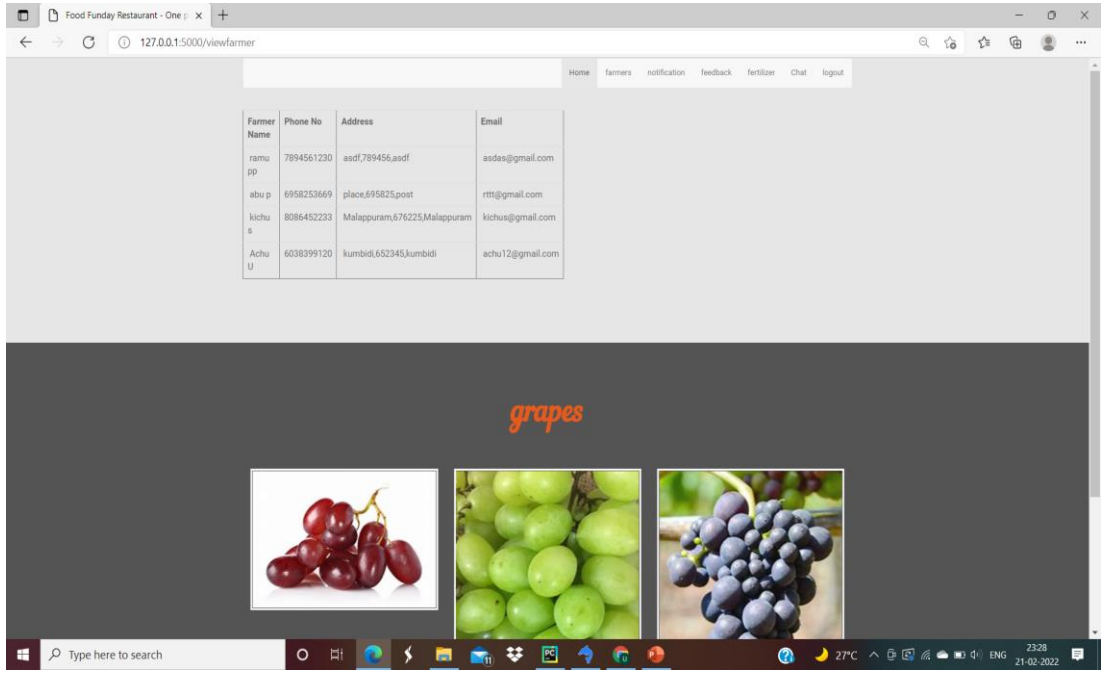
Backlog item	Status and completion date	Original estimate in hours	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9	Day10	Day11	Day12	Day13	Day14
User story#1,#2,#3			hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs
Table design	28/12/2021	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Form design	31/12/2021	3	0		1	1	1	0	0	0	0	0	0	0	0	0
Basic coding	08/01/2022	5	0	0	0	0	0	1	1	1	1	1	0	0	0	0
User story #4,#5																
collects the features of the disease	16/01/2022	5	1	1	0	1	1	1	0	0	0	0	0	0	0	0
Training the data	22/01/2022	5	0	0	0	0	0	0	0	1	1	0	1	1	1	0
User story #6,#7																
classify different leaf images using SVM	27/01/2022	5	1	1	1	0	1	1	0	0	0	0	0	0	0	0
find Black Rot disease	05/02/2022	5	0	0	0	0	0	0	0	1	1	1	1	1	0	0
User story #8,#9																
Testing data	10/02/2022	5	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Output generation	20/02/2022	5	0	0	0	0	0	0	2	2	2	0	0	0	0	0
Total		40	4	4	3	3	4	3	3	5	4	2	2	2	1	0

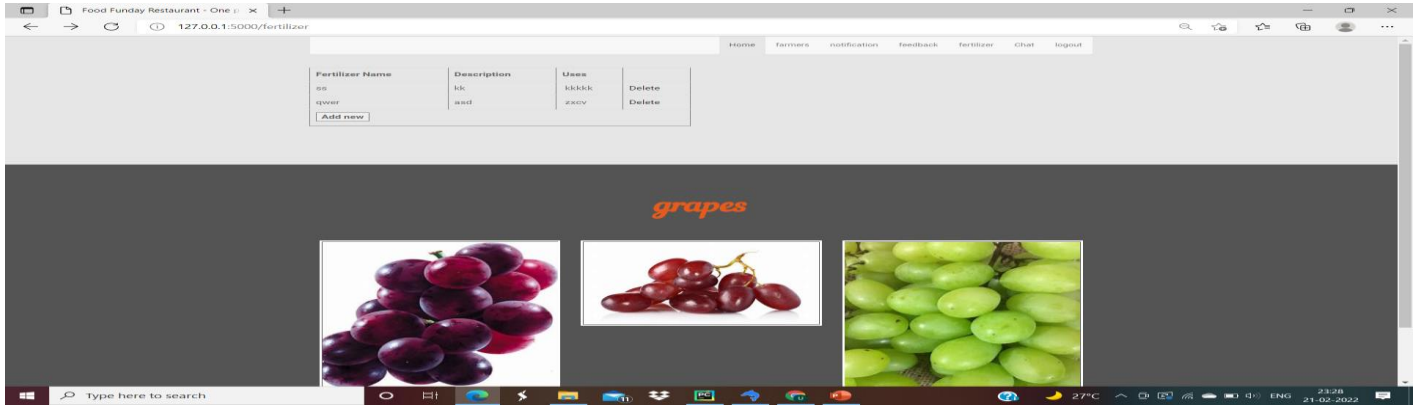
SPRINT ACTUAL

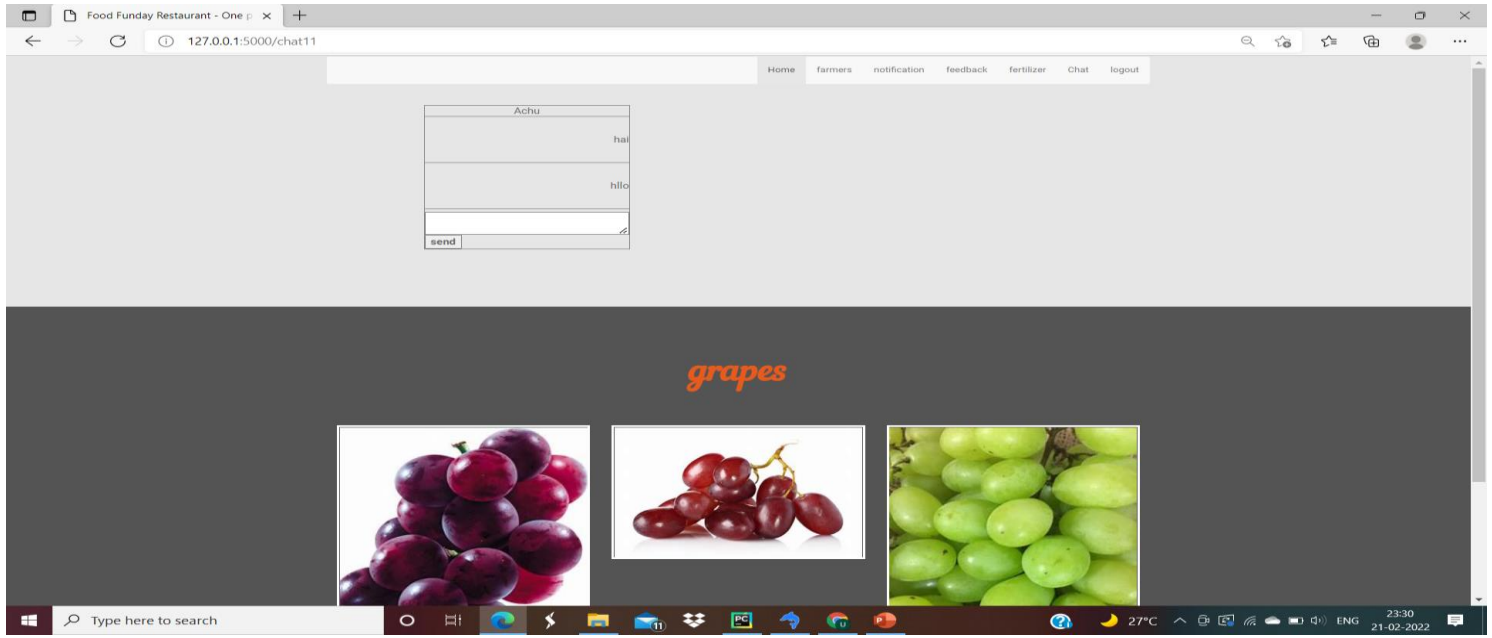
Backlog item	Status and completion date	Original estimate in hours	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9	Day10	Day11	Day12	Day13	Day14
User story#1,#2,#3			hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs
Table design	28/12/2021	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Form design	31/12/2021	3	0	0	2	1	0	0	0	0	0	0	0	0	0	0
Basic coding	08/01/2022	5	0	0	0	0	0	1	1	1	2	0	0	0	0	0
User story #4,#5																
collects the features of the disease	22/01/2022	8	2	0	0	2	0	2	0	0	1	0	1	0	0	0
Training the data	22/01/2022	5	1	0	0	0	2	0	0	1	0	0	1	0	0	0
User story #6,#7																
classify different leaf images using SVM	5/02/2022	5	1	0	0	0	2	0	0	0	0	2	0	0	0	0
find Black Rot disease	17/02/2022	7	2	0	0	0	0	2	0	0	0	0	2	1	0	0
User story #8,#9																
Testing data	20/02/2022	5	2	0	0	0	0	0	0	2	0	0	0	0	1	0
Output generation	20/02/2022	4	0	0	0	0	0	0	2	2	0	0	0	0	0	0
Total		44	9	1	2	3	4	5	3	6	3	2	4	1	1	0

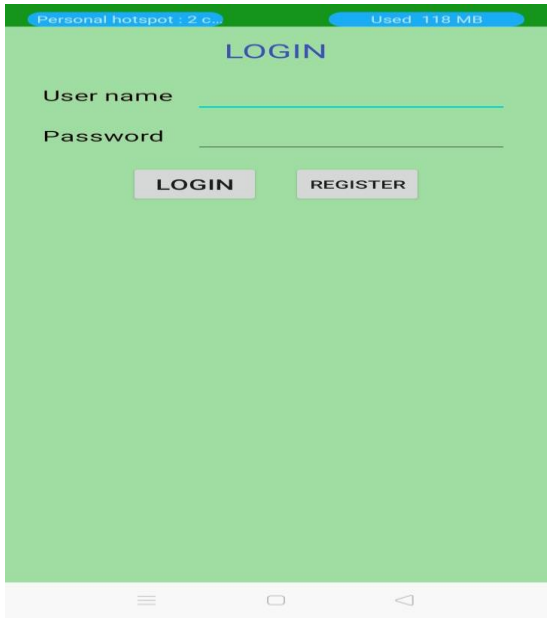
Screenshots

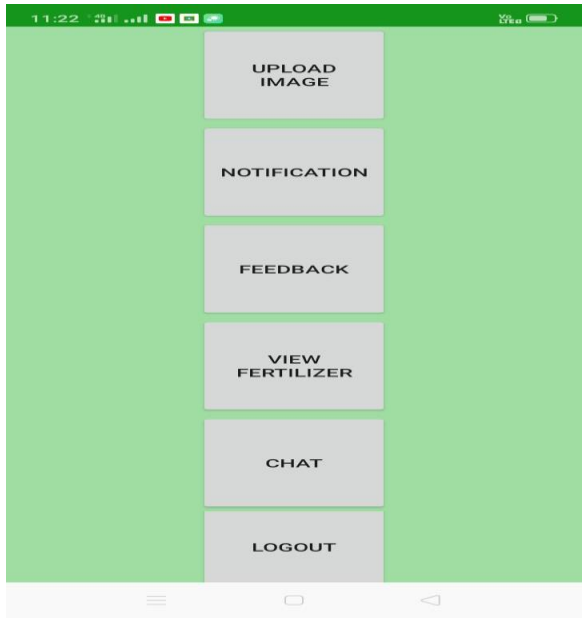


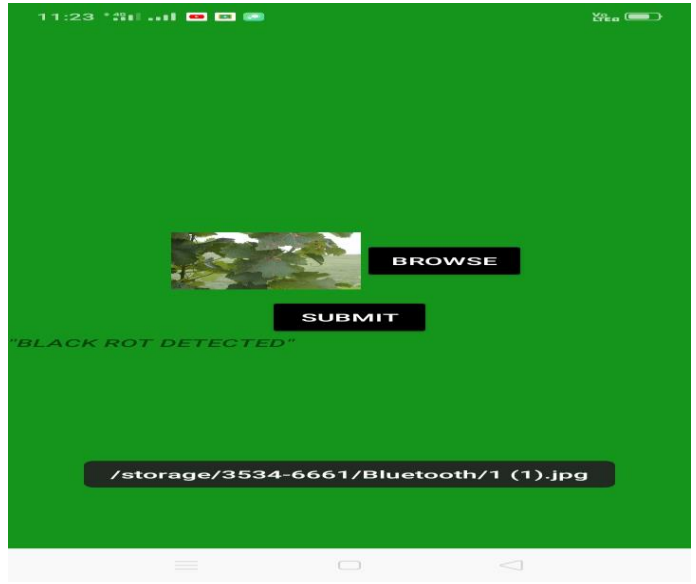


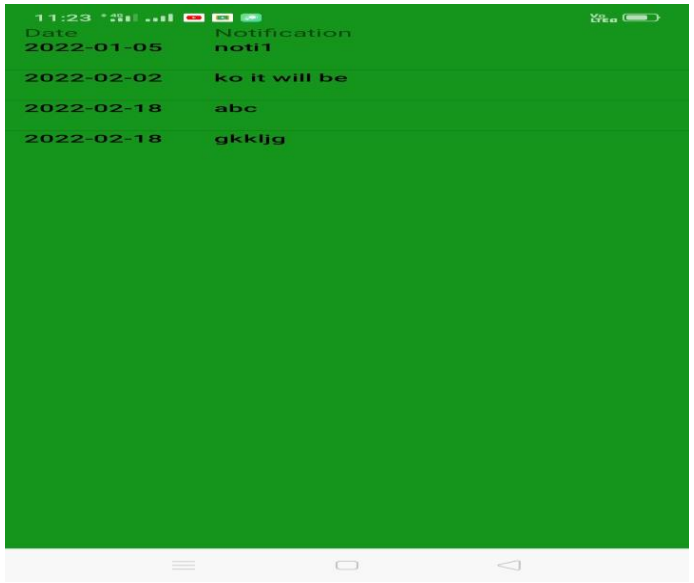

Food Funday Restaurant - One
127.0.0.1:5000/fertilizer
Home
farmers
notification
feedback
fertilizer
Chat
logout
Fertilizer Name
Description
Uses
ss
kk
kkkkk
Delete
qwer
asd
zxcv
Delete
Add new
grapes
Type here to search
27°C
ENG
23:28
21-02-2022

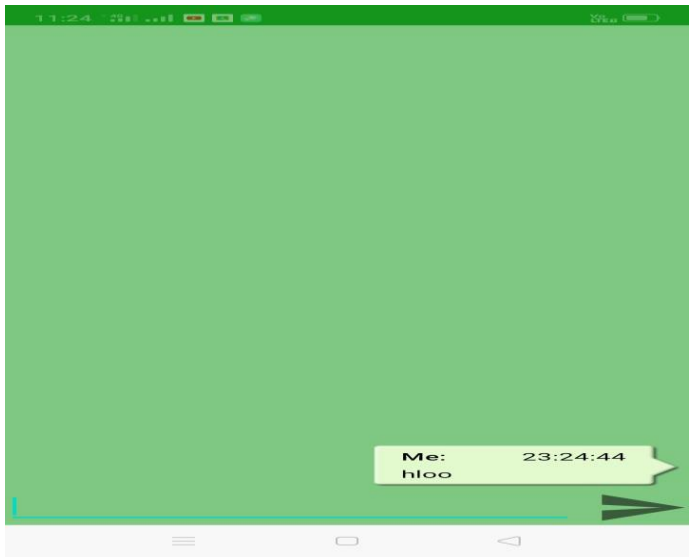

Food Funday Restaurant - One
127.0.0.1:5000/chat11
Home
farmers
notification
feedback
fertilizer
Chat
logout
Achu
hai
hllo
send
grapes
Type here to search
27°C
ENG
23:30
21-02-2022


Personal hotspot : 2 c...
Used 118 MB
LOGIN
User name
Password
LOGIN
REGISTER


11:22
UPLOAD IMAGE
NOTIFICATION
FEEDBACK
VIEW FERTILIZER
CHAT
LOGOUT


11:23
BROWSE
SUBMIT
"BLACK ROT DETECTED"
/storage/3534-6661/Bluetooth/1 (1).jpg


11:23
Date
Notification
2022-01-05
noti1
2022-02-02
ko it will be
2022-02-18
abc
2022-02-18
gkkljg


11:24
Me:
23:24:44
hloo

THANK YOU